

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1-27. (Cancelled).

28. (Previously Presented) A transmit canceller in a communication channel, the channel including a first transceiver for transmitting and receiving signals and a replica transmitter for generating an input replica transmission signal, a composite signal at a near end comprising a transmission signal of the first transceiver and a signal received from a second transceiver, said transmit canceller comprising:

an operational amplifier having a first polarity input terminal, a second polarity input terminal, and an output terminal;

a feedback element in communication with the second polarity input terminal and the output terminal;

a first input resistor in communication with the second polarity input terminal and the measured signal input;

a second input resistor in communication with the second polarity input terminal and the replica signal input; and

a predetermined voltage source in communication with the first polarity input terminal of the operational amplifier,

wherein the received signal is an output at the output terminal of the operational amplifier.

29. (Previously Presented) The transmit canceller according to Claim 28, further comprising a connection between a baseline correction current source and the second polarity input terminal.

30. (Original) The transmit canceller according to Claim 29, further comprising a charge pump to control the baseline correction current source.

31. (Original) The transmit canceller according to Claim 30, wherein the charge pump controls the baseline correction current source based on an error between an equalized baseline signal and a sliced baseline signal.

32. (Previously Presented) The transmit canceller according to Claim 29, further comprising a connection between a common-mode shift current source and the second polarity input terminal.

33. (Original) The transmit canceller according to Claim 28, wherein the replica signal comprises a high pass signal.

34. (Previously Presented) The transmit canceller according to Claim 28, wherein the replica signal comprises a negative signal and the transmit canceller further includes a third resistor in communication with the second polarity input terminal and a low pass positive replica signal input.

35. (Original) The transmit canceller according to Claim 28, wherein the communication channel comprises a gigabit channel.

36. (Previously Presented) A transmit canceller in a communication channel, the channel including a first transceiver for transmitting and receiving signals and a replica transmitter for generating an input replica transmission signal, a composite signal at a near end comprising a transmission signal of the first transceiver and a signal received from a second transceiver, said transmit canceller comprising:

means for amplifying including a first polarity input terminal, a second polarity input terminal, and an output terminal;

feedback means for communicating with the second polarity input terminal and the output terminal;

first means for communicating with the second polarity input terminal and the measured signal input;

second means for communicating with the second polarity input terminal and the replica signal input; and

means for supplying a predetermined voltage to the first polarity input terminal of the amplifying means,

wherein the received signal is an output at the output terminal of the amplifying means.

37. (Original) The transmit canceller according to Claim 36, further comprising means for correcting baseline wander.

38. (Original) The transmit canceller according to Claim 37, further comprising means for pumping to control the baseline correcting means.

39. (Original) The transmit canceller according to Claim 38, wherein the means for pumping controls the baseline correction means based on an error between an equalized baseline signal and a sliced baseline signal.

40. (Previously Presented) The transmit canceller according to Claim 37, further comprising means for connecting a common-mode shift current source and the second polarity input terminal.

41. (Original) The transmit canceller according to Claim 36, wherein the replica signal comprises a high pass signal.

42. (Previously Presented) The transmit canceller according to Claim 36, wherein the replica signal comprises a negative signal and the transmit canceller further includes a third means for communicating with the second polarity input terminal and a low pass positive replica signal input.

43. (Original) The transmit canceller according to Claim 36, wherein the communication channel comprises a gigabit channel.

44. (Previously Presented) A method of reducing a transmission signal from a composite signal in a communication channel, the channel including a first transceiver for transmitting and receiving signals and a replica transmitter for generating an input replica transmission signal, the composite signal at a near end comprising a transmission signal of the first transceiver and a signal received from a second transceiver, said method comprising the steps of:

providing an operational amplifier having a first polarity input terminal, a second polarity input terminal, and an output terminal;

arranging a feedback element to be in communication with the second polarity input terminal and the output terminal;

arranging a first resistive element to be in communication with the second polarity input terminal and the measured signal input;

arranging a second resistive element to be in communication with the second polarity input terminal and the replica signal input;

arranging a predetermined voltage source to be in communication with the first polarity input terminal of the operational amplifier; and

outputting a signal at the output terminal that reduces the transmission signal.

45. (Previously Presented) The method according to Claim 44, further comprising a step of connecting a baseline correction current source to the second polarity input terminal of the operational amplifier.

46. (Original) The method according to Claim 45, further comprising a step of controlling the baseline correction current source with a charge pump.

47. (Original) The method according to Claim 46, wherein the charge pump controls the baseline correction current source based on an error between an equalized baseline signal and a sliced baseline signal.

48. (Previously Presented) The method according to Claim 45, further comprising a step of connecting a common-mode shift current source to the second polarity input terminal to control a common-mode voltage of the operational amplifier.

49. (Original) The method according to Claim 44, wherein the replica signal comprises a high pass signal.

50. (Previously Presented) The method according to Claim 44, wherein the replica signal comprises a negative signal and the transmit canceller further includes a third resistive element in communication with the second polarity input terminal and a low pass positive replica signal input.

51. (Original) The method according to Claim 44, wherein the communication channel comprises a gigabit channel.

52. (Cancelled)

53. (Currently Amended) The communication system according to Claim 52 54, wherein said active resistive summer includes an operational amplifier.

54. (Previously Presented) A communication system including a first – transmission channel with a first end and a second end, the first end coupled to a first transformer and the second end coupled to a second transformer, a first end transceiver transmitting and receiving signals via the first transformer and a second end transceiver transmitting and receiving signals via the second transformer, a first signal being supplied at the first end, the first signal comprising a transmission signal component of the first transceiver and a receive signal component from the second transceiver, said communication system comprising:

a replica transmitter that generates a replica of the transmission signal component of the first transceiver;

a filter to filter the replica signal; and

an active resistive summer receiving the first signal and the filtered replica signal as inputs to reduce the transmission signal component at an output of the active resistive summer, wherein said active resistive summer includes an operational amplifier having a first polarity input terminal, a second polarity input terminal, and an output terminal, said active resistive summer further comprising:

a feedback element in communication with the output terminal and the second polarity input terminal;

a first resistor in communication with the second polarity input terminal and the first signal; and

a second resistor in communication with the second polarity input terminal and the filtered replica signal.

55. (Previously Presented) The communication system according to Claim 54, wherein the active resistive summer receives an inverted replica signal as an input, and

wherein a third resistor is in communication with the inverted replica signal and the second polarity input terminal.

56. (Original) The communication system according to Claim 55, wherein the active resistive summer includes an input for baseline correction current.

57. (Original) The communication system according to Claim 56, further comprising a charge pump that controls the current for the baseline current.

58. (Original) The communication system according to Claim 57, wherein the charge pump controls current based on a digital error between an equalized baseline signal and a sliced baseline signal.

59. (Original) The communication system according to claim 56, wherein the active resistive summer includes an input for common-mode shift current.

60. (Cancelled)

61. (Currently Amended) The communication system according to Claim ~~60~~ 62, wherein said summing means includes means for amplifying.

62. (Previously Presented) A communication system including a first transmission channel with a first end and a second end, the first end coupled to a first transformer and the second end coupled to a second transformer, a first end transceiver transmitting and receiving signals via the first transformer and a second end transceiver transmitting and receiving signals via the second transformer, a first signal being supplied at the first end, the first signal comprising a transmission signal component of the first transceiver and a receive signal component of the second transceiver, said communication system comprising:

means for replicating the transmission signal component of the first transceiver;

means for filtering an output of the replicating means; and

means for summing the first signal and an output of the filtering means to reduce the transmission signal at an output of the summing means, wherein said summing means includes means for amplifying having a first polarity input terminal, a second polarity input terminal, and an output terminal, said summing means further comprising:

feedback means for communicating between the output terminal and the second polarity input terminal;

first resistive means for communicating between the second polarity input terminal and the first signal; and

second resistive means for communicating between the second polarity input terminal and the filtered replica transmission signal component.

63. (Previously Presented) The communication system according to Claim 62, wherein the summing means further sums an inverted replica transmission signal component, and

wherein a third resistor is in communication with the inverted replica transmission signal component and the second polarity input terminal.

64. (Original) The communication system according to claim 63, wherein the summing means includes means for receiving a baseline correction current.

65. (Original) The communication system according to Claim 64, further comprising means for controlling the current for the baseline current.

66. (Original) The communication system according to Claim 65, wherein the pumping means controls current based on a digital error between an equalized baseline signal and a sliced baseline signal.

67. (Original) The communication system according to claim 64, wherein the communication system includes means for controlling common-mode voltage.

68. (Cancelled)

69. (Currently Amended) The method according to Claim ~~68~~ 70, wherein the active resistive summer includes an operational amplifier.

70. (Previously Presented) A method in a communication system including a first transmission channel with a first end and a second end, the first end coupled to a first transformer and the second end coupled to a second transformer, a first end transceiver transmitting and receiving signals via the first transformer and a second end transceiver transmitting and receiving signals via the second transformer, a first signal being supplied at the first end, the first signal comprising a transmission signal component of the first transceiver and a receive signal component of the second transceiver, said method comprising the steps of:

generating a replica of the transmission signal component of the first transceiver;

filtering the replica signal; and

summing with an active resistive summer the first signal and the replica signal to reduce the transmission signal at an output of the active resistive summer, wherein the active resistive summer includes an operational amplifier having a first polarity input terminal, a second polarity input terminal, and an output terminal, said active resistive summer further comprising:

a feedback element in communication with the output terminal and the second polarity input terminal;

a first resistor in communication with the second polarity input terminal and the first signal; and

a second resistor in communication with the second polarity input terminal and the filtered replica transmission signal.

71. (Previously Presented) The method according to Claim 70, wherein the active resistive summer sums an inverted replica transmission signal component, and wherein the third resistor is in communication with the inverted replica transmission signal component and the second polarity input terminal.

72. (Original) The method according to Claim 71, further comprising the step of inputting baseline correction current into the active resistive summer.

73. (Original) The method according to Claim 72, further comprising a step of controlling the baseline current with a charge pump.

74. (Original) The method according to Claim 73, wherein the charge pump controls current based on an error between an equalized baseline signal and a sliced baseline signal.

75. (Original) The method according to claim 72, further comprising the step of inputting a common-mode shift current into the active resistive summer to control a common-mode voltage of the operational amplifier.

76-87. (Cancelled)

88. (Previously Presented) An electrical circuit for reducing a transmission signal comprising:

an active resistive summer having an operational amplifier that includes a first polarity input terminal, a second polarity input terminal, and an output terminal, said active resistive summer further comprising:

a feedback element in communication with the output terminal and the second polarity input terminal;

a first resistor in communication with the second polarity input terminal and a composite signal, the composite signal having a transit signal component and a receive signal component; and

a second resistor in communication with the second polarity input terminal and a replica of the transmit signal.

89. (Currently Amended) An electrical circuit for reducing a transmission signal comprising:

means for active summing including a first polarity input terminal, a second polarity input terminal, and an output terminal, said active summing means further comprising:

feedback means for communicating with the output terminal and the second polarity input terminal;

means for communicating with the second polarity input terminal and a composite signal, the composite signal having a transit signal component and a receive signal component; and

means for communicating with the second polarity input terminal and a replica of the transmit signal,

wherein each of the feedback means, the composite signal, and the replica signal are connected together at the second polarity input terminal.

90. (Currently Amended) Apparatus for reducing transmission noise in a communications-channel, comprising:

an input to receive a near end transmit signal;

an input to receive a far end receive signal;

an input to receive a replica of transmission noise in the transmit signal; and

a summer connected to all three inputs and providing an output which reduces the transmission noise of the transmit signal, wherein the summer includes a feedback element, wherein each of the inputs and the feedback element are connected together at a negative input terminal of the summer.

91. (Original) The apparatus according to Claim 90, further comprising a replica signal generator to provide the replica to the replica input.

92. (Original) The apparatus according to Claim 91, wherein the summer comprises an operational amplifier.

93. (Currently Amended) Apparatus for reducing transmission noise in a communications channel, comprising:

means for receiving a near end transmit signal;

means for receiving a far end receive signal;

means for receiving a replica of transmission noise in the transmit signal; and

means for summing all three inputs and for providing an output which reduces the transmission noise of the transmit signal, wherein the summing means includes feedback means for communicating between the output and the inputs, wherein each of the receiving means and the feedback means are connected together at a negative input terminal of the summing means.

94. (Original) The apparatus according to Claim 93, further comprising means for generating a replica signal and for providing the replica to said means for receiving a replica.

95. (Original) The apparatus according to Claim 94, wherein the summing means comprises means for amplifying.

96. (Currently Amended) An electrical circuit in a communications channel comprising:

an active resistive summer,

wherein the active resistive summer comprises an operational amplifier with an inverting feedback, and

wherein the active resistive summer further comprises:

an input for a composite signal, the composite signal including a transmission signal component and a receive signal component;

an input for a replica transmission signal; and

an output for a receive signal which comprises the composite signal minus the replica signal, wherein each of the composite signal, the replica transmission signal, and the inverting feedback are connected together at a common input of the active resistive summer.

97. (Currently Amended) An electrical circuit in a communications channel comprising:

an active resistive summer,

wherein the active resistive summer comprises an operational amplifier with an inverting feedback, and

wherein the active resistive summer further comprises:

an input for a composite signal, the composite signal including a transmission signal component and a receive signal component;

an input for a replica transmission signal; and

an output for a receive signal which comprises the composite signal minus the replica signal.

~~The electrical circuit according to Claim 96,~~ wherein the operational amplifier includes a first polarity input terminal, a second polarity input terminal, and an output terminal, and

wherein the active resistive summer further comprises:

a feedback element in communication with the output terminal and the second polarity input terminal;

a first resistor in communication with the second polarity input terminal and the composite signal; and

a second resistor in communication with the second polarity input terminal and the replica transmission signal.

98. (Previously Presented) The electrical circuit according to Claim 97, wherein the replica transmission signal comprises a high pass signal.

99. (Previously Presented) The electrical circuit according to Claim 97, wherein the replica transmission signal comprises a negative replica transmission signal as a first signal and a low pass replica transmission signal as a second signal,

wherein the second resistor comprises a third resistor and a fourth resistor, and

wherein the third resistor is in communication with the first signal and the second polarity input terminal and the fourth resistor is in communication with the second signal and the second polarity input terminal.

100. (Previously Presented) The electrical circuit according to Claim 97, wherein the active resistive summer further comprises an input for receiving a current for baseline correction.

101. (Previously Presented) The electrical circuit according to Claim 100, further comprising a charge pump to control the current for the baseline current.

102. (Previously Presented) The electrical circuit according to Claim 101, wherein the charge pump controls current based on an error between an equalized baseline signal and a sliced baseline signal.

103. (Previously Presented) The electrical circuit according to Claim 100, wherein the active resistive summer further comprises an input to receive a common-mode shift current.

104. (Currently Amended) An electrical circuit in a communications channel comprising:

means for summing,

wherein the summing means comprises means for amplifying with means for inverting feedback, and

wherein the summing means further comprises:

means for inputting a composite signal, the composite signal including a transmission signal component and a receive signal component;

means for inputting a replica transmission signal; and

means for outputting a receive signal which comprises the composite signal minus the replica signal, wherein each of the composite signal, the replica transmission signal, and the inverting feedback means are connected together at a common input of the summing means.

105. (Currently Amended) An electrical circuit in a communications channel comprising:

means for summing,

wherein the summing means comprises means for amplifying with means for inverting feedback, and

wherein the summing means further comprises:

means for inputting a composite signal, the composite signal including a transmission signal component and a receive signal component;

means for inputting a replica transmission signal; and

means for outputting a receive signal which comprises the composite signal minus the replica signal,

~~The electrical circuit according to Claim 104,~~ wherein the means for amplifying including a first polarity input terminal, a second polarity input terminal, and an output terminal, and

wherein the summing means further comprises:

feedback means for communicating with the output terminal and the second polarity input terminal;

first resistive means for communicating with the second polarity input terminal and the composite signal; and

second resistive means for communicating with the second polarity input terminal and the replica transmission signal.

106. (Previously Presented) The electrical circuit according to Claim 105, wherein the replica transmission signal comprises a high pass signal.

107. (Previously Presented) The electrical circuit according to claim 105, wherein the replica transmission signal comprises a negative replica transmission signal as a first signal and a low pass replica transmission signal as a second signal,

wherein the second resistive means comprises a third resistive means and a fourth resistive means, and

wherein the third resistive means is for communicating with the first signal and the second polarity input terminal and the fourth resistive means is for communicating with the second signal and the second polarity input terminal.

108. (Previously Presented) The electrical circuit according to Claim 105, wherein the summing means further comprises means for receiving a current for baseline correction.

109. (Previously Presented) The electrical circuit according to Claim 108, further comprising means for pumping to control the current for the baseline current.

110. (Previously Presented) The electrical circuit according to Claim 109, wherein the pumping means controls current based on an error between an equalized baseline signal and a sliced baseline signal.

111. (Previously Presented) The electrical circuit according to Claim 108, wherein the summing means further comprises means for receiving a common-mode shift current.

112. (Currently Amended) A method of reducing a transmission signal from a composite signal in a communications channel, comprising the steps of:

inputting the composite signal into an active resistive summer, the composite signal including the transmission signal component and a receive signal component,

wherein the active resistive summer includes an operational amplifier with inverting feedback;

inputting a replica transmission signal into the active resistive summer; and

outputting a signal from the active resistive summer which comprises the composite signal minus the replica transmission signal, wherein each of the composite signal, the inverting feedback, and the replica signal are connected together at a common input of the active resistive summer.

113. (Currently Amended) A method of reducing a transmission signal from a composite signal in a communications channel, comprising the steps of:

inputting the composite signal into an active resistive summer, the composite signal including the transmission signal component and a receive signal component,

wherein the active resistive summer includes an operational amplifier with inverting feedback;

inputting a replica transmission signal into the active resistive summer; and
outputting a signal from the active resistive summer which comprises the composite signal minus the replica transmission signal,

~~The method according to Claim 112,~~ wherein the operational amplifier includes a first polarity input terminal, a second polarity input terminal, and an output terminal, and

wherein the active resistive summer further includes:

a feedback element in communication with the output terminal and the second polarity input terminal;

a first resistor in communication with the second polarity input terminal and the composite signal; and

a second resistor in communication with the second polarity input terminal and the replica transmission signal.

114. (Previously Presented) The method according to Claim 113, wherein the replica transmission signal comprises a high pass signal.

115. (Previously Presented) The method according to Claim 113, wherein the replica transmission signal comprises a negative replica transmission signal as a first signal and a low pass replica transmission signal as a second signal, and

wherein the second resistor comprises a third resistor and a fourth resistor, and

wherein the third resistor is in communication with the first signal and the second polarity input terminal and the fourth resistor is in communication with the second signal and the second polarity input terminal.

116. (Previously Presented) The method according to Claim 115, further comprising the step of inputting a current into the active resistive summer to correct baseline wander.

117. (Previously Presented) The method according to Claim 116, further comprising the step of controlling the current for correcting the baseline wander with a charge pump.

118. (Previously Presented) The method according to Claim 117, wherein the charge pump controls current based on an error between an equalized baseline signal and a sliced baseline signal.

119. (Previously Presented) The method according to Claim 116, further comprising the step of inputting a common-mode shift current into the active resistive summer.

120. (Currently Amended) A method of reducing a transmission signal from a composite signal in a communication channel, the channel including a first transceiver and a second transceiver each to transmit and receive signals, the method comprising the steps of:

providing the composite signal, wherein the composite signal comprises the transmission signal of the first transceiver and a receive signal of the second transceiver;

generating a replica of the transmission signal; and

subtracting the replica signal from the composite signal through an active resistive summer,

wherein the active resistive summer includes an operational amplifier with inverting feedback and each of the composite signal, the inverting feedback, and the replica signal are connected together at a common input of the active resistive summer.